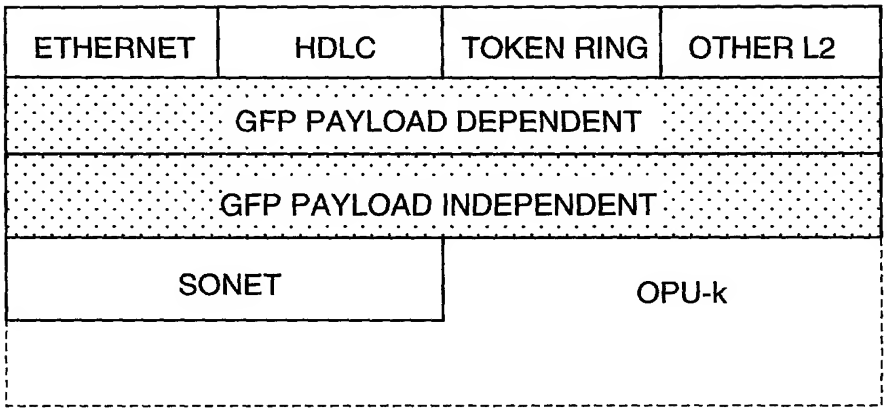

ETHERNET
HDLC
TOKEN RING
OTHER L2
GFP PAYLOAD DEPENDENT
GFP PAYLOAD INDEPENDENT
SONET
OPU-k

Fig. 1

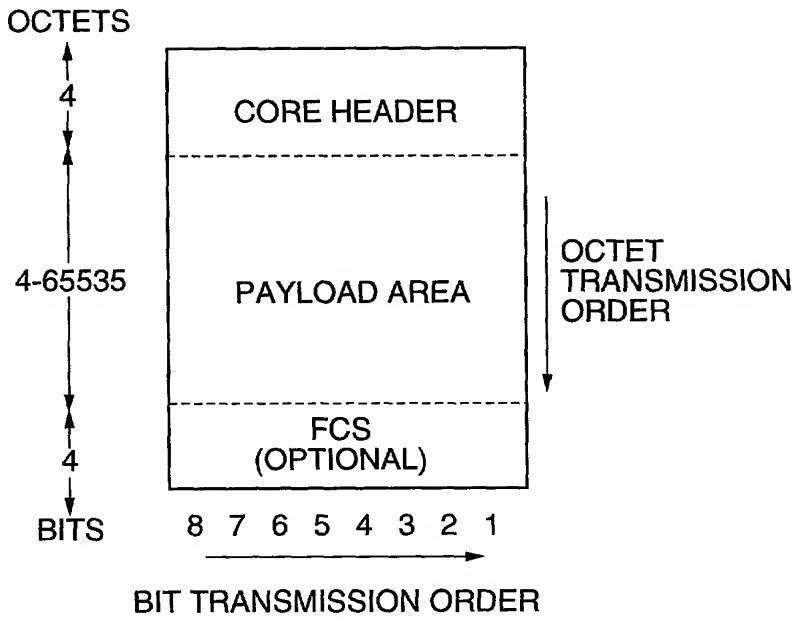

OCTETS
4
4-65535
4
BITS
CORE HEADER
PAYLOAD AREA
FCS
(OPTIONAL)
OCTET
TRANSMISSION
ORDER
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 2

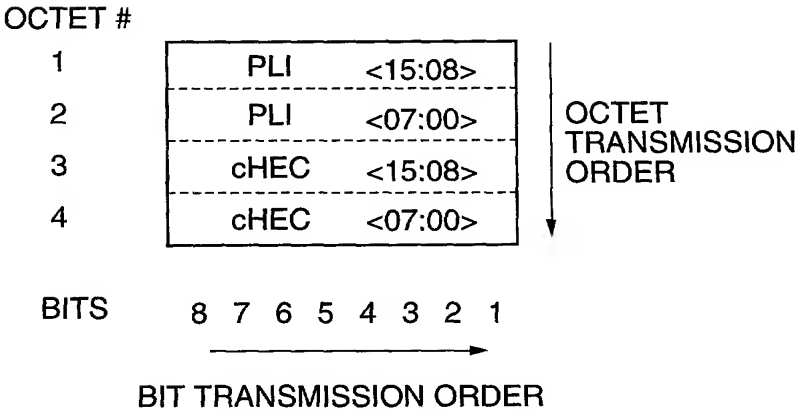

OCTET #
1
2
3
4
PLI <15:08>
PLI <07:00>
cHEC <15:08>
cHEC <07:00>
OCTET
TRANSMISSION
ORDER
BITS
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 3

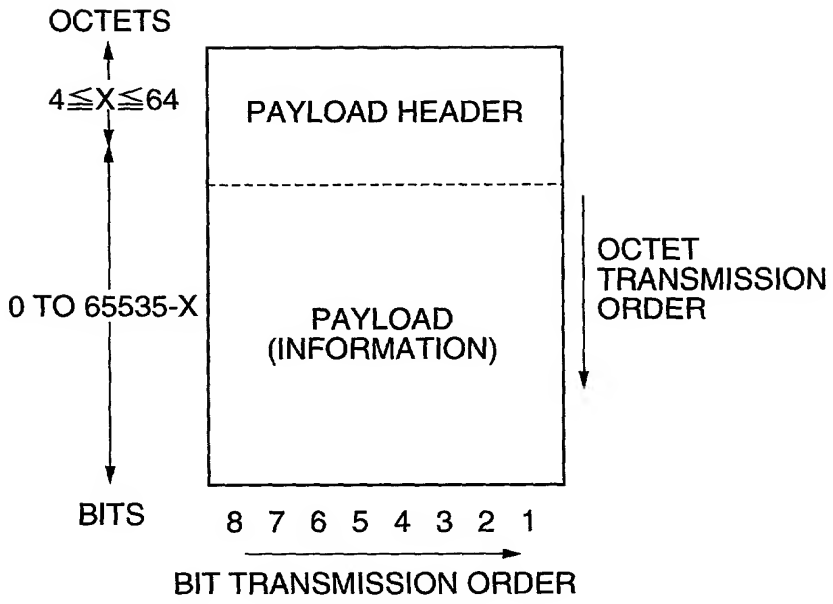

OCTETS
4≦X≦64
0 TO 65535-X
PAYLOAD HEADER
PAYLOAD
(INFORMATION)
OCTET
TRANSMISSION
ORDER
BITS
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 4

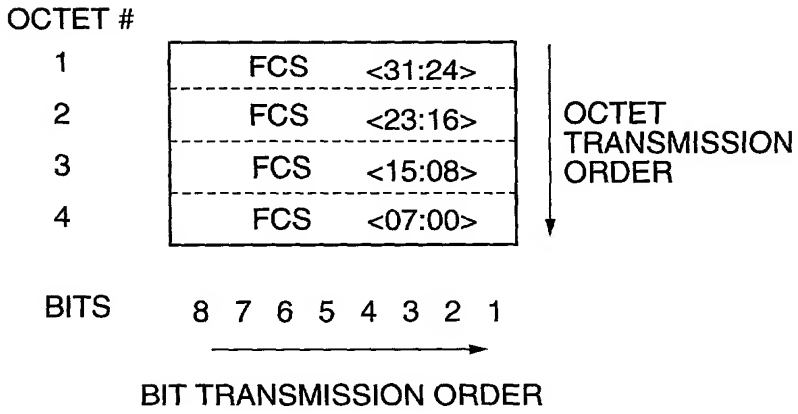

OCTET #
1
2
3
4
FCS <31:24>
FCS <23:16>
FCS <15:08>
FCS <07:00>
OCTET
TRANSMISSION
ORDER
BITS
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 5

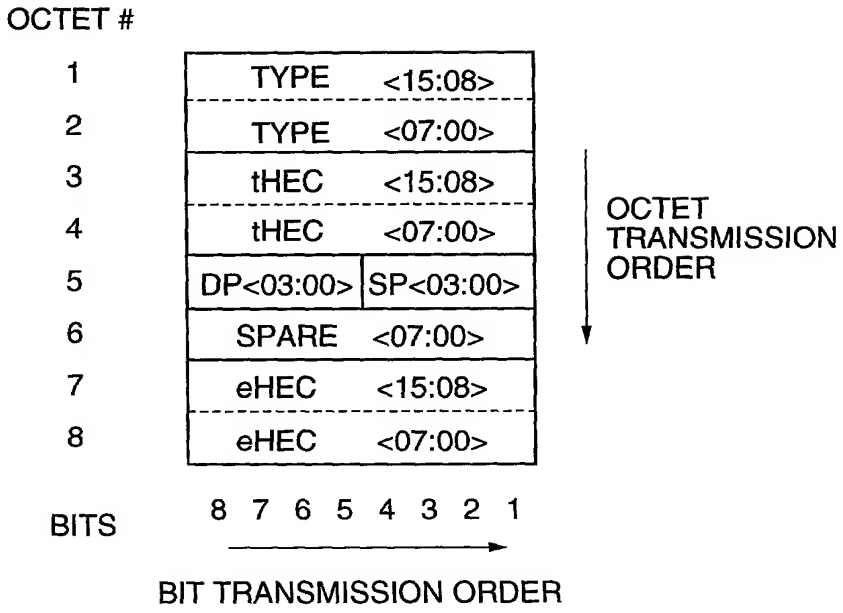

OCTET #
1
2
3
4
5
6
7
8
TYPE <15:08>
TYPE <07:00>
tHEC <15:08>
tHEC <07:00>
DP<03:00>
SP<03:00>
SPARE <07:00>
eHEC <15:08>
eHEC <07:00>
OCTET TRANSMISSION ORDER
BITS
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 6

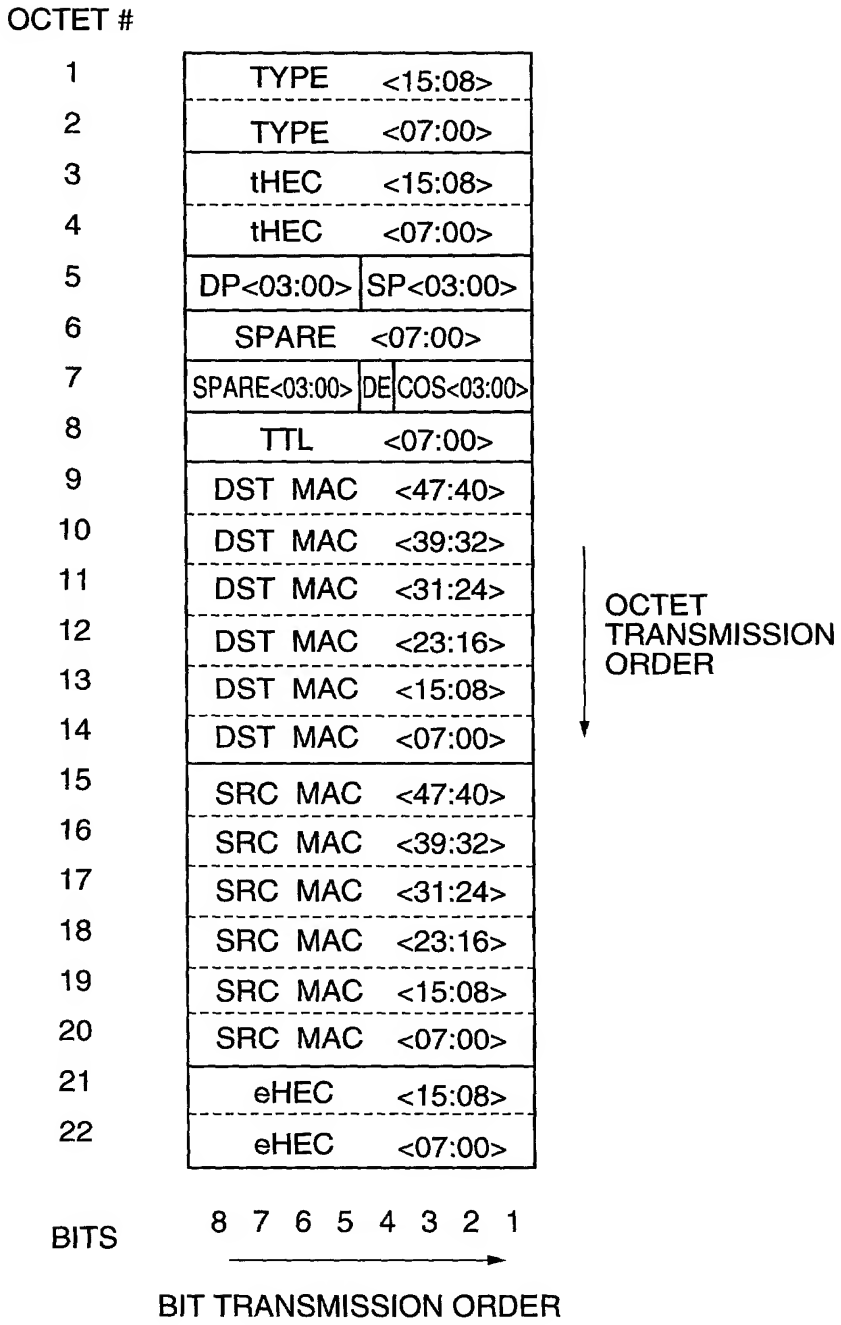
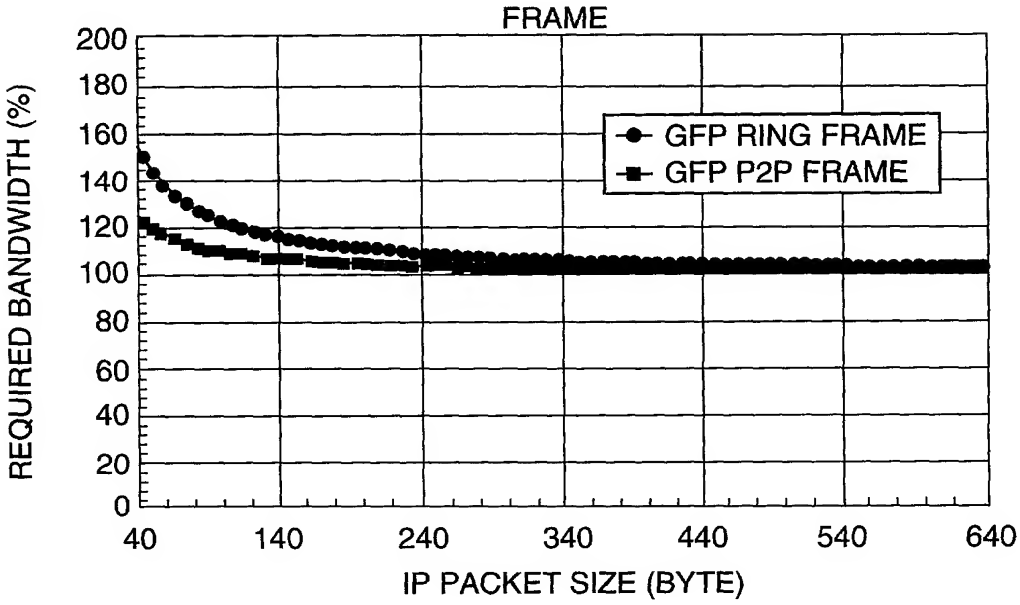

OCTET #
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
TYPE <15:08>
TYPE <07:00>
tHEC <15:08>
tHEC <07:00>
DP<03:00>
SP<03:00>
SPARE <07:00>
SPARE<03:00>
DE
COS<03:00>
TTL <07:00>
DST MAC <47:40>
DST MAC <39:32>
DST MAC <31:24>
DST MAC <23:16>
DST MAC <15:08>
DST MAC <07:00>
SRC MAC <47:40>
SRC MAC <39:32>
SRC MAC <31:24>
SRC MAC <23:16>
SRC MAC <15:08>
SRC MAC <07:00>
eHEC <15:08>
eHEC <07:00>
OCTET TRANSMISSION ORDER
BITS
8 7 6 5 4 3 2 1
BIT TRANSMISSION ORDER

Fig. 7

REQUIRED BANDWIDTH WHEN TRANSMITTING PPP FRAME INTO GFP FRAME



OVERHEAD BY RING AND P2P FRAME FOR HDLC

Fig. 8

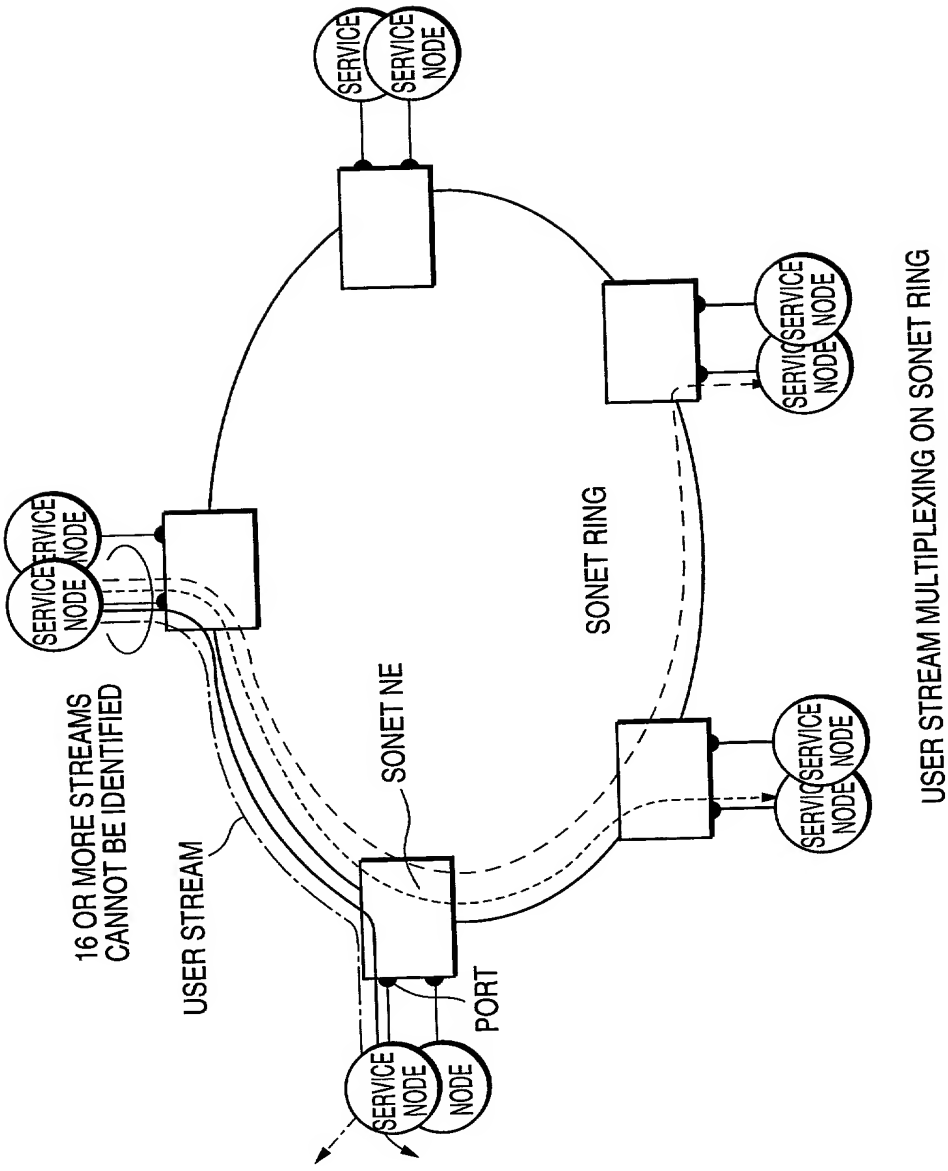

SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SERVICE NODE
SONET RING
SONET NE
PORT
USER STREAM
16 OR MORE STREAMS CANNOT BE IDENTIFIED
USER STREAM MULTIPLEXING ON SONET RING

Fig. 9

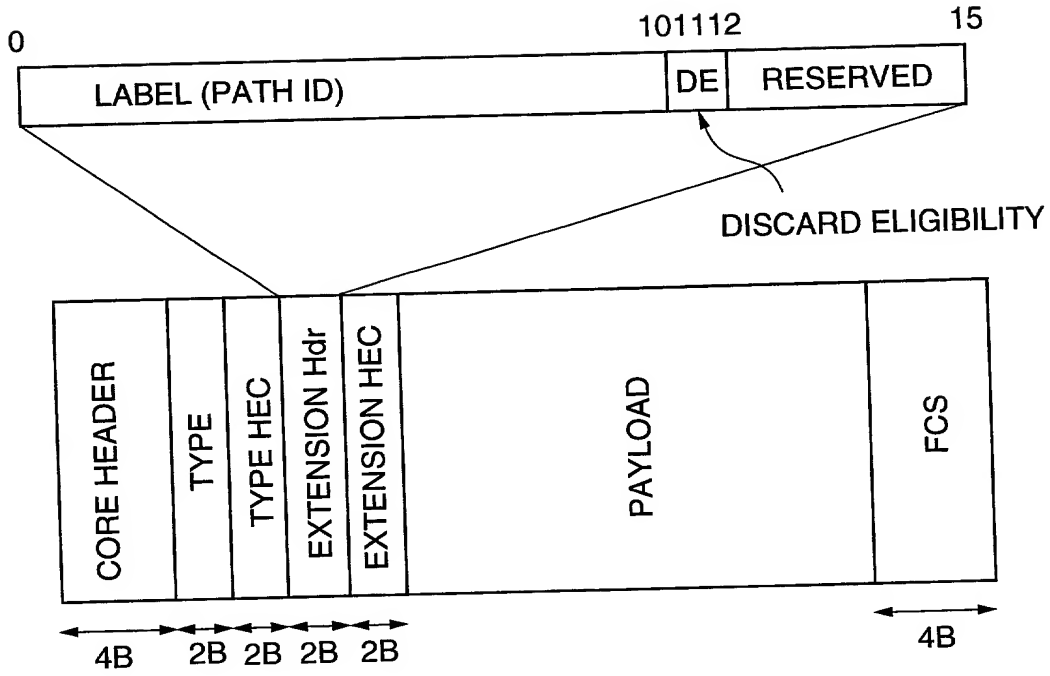

0
101112
15
LABEL (PATH ID)
DE
RESERVED
DISCARD ELIGIBILITY
CORE HEADER
TYPE
TYPE HEC
EXTENSION Hdr
EXTENSION HEC
PAYLOAD
FCS
4B
2B
2B
2B
2B
4B

Fig. 10

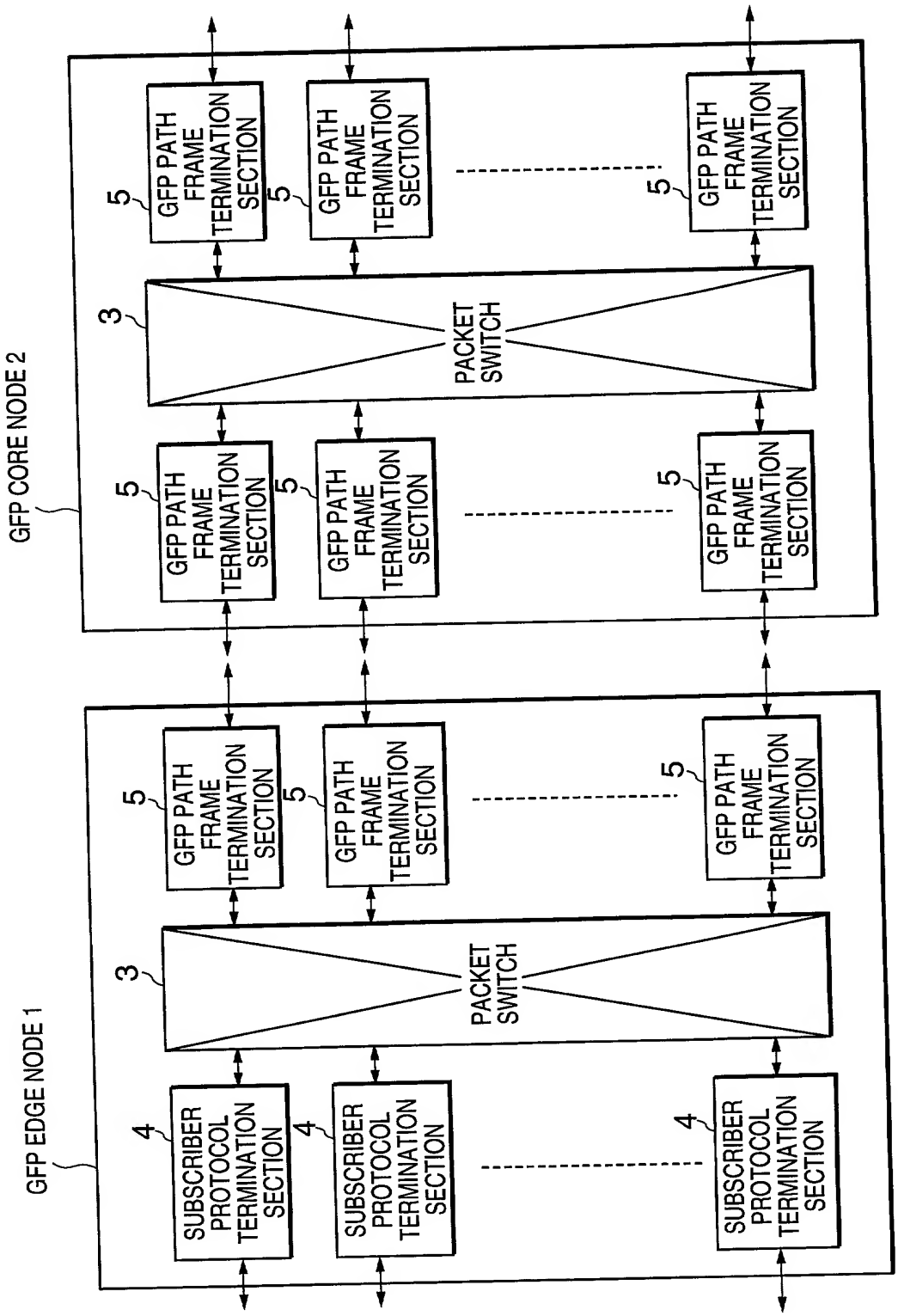

GFP CORE NODE 2
GFP EDGE NODE 1
GFP PATH FRAME TERMINATION SECTION
PACKET SWITCH
SUBSCRIBER PROTOCOL TERMINATION SECTION
3
4
5

Fig. 11

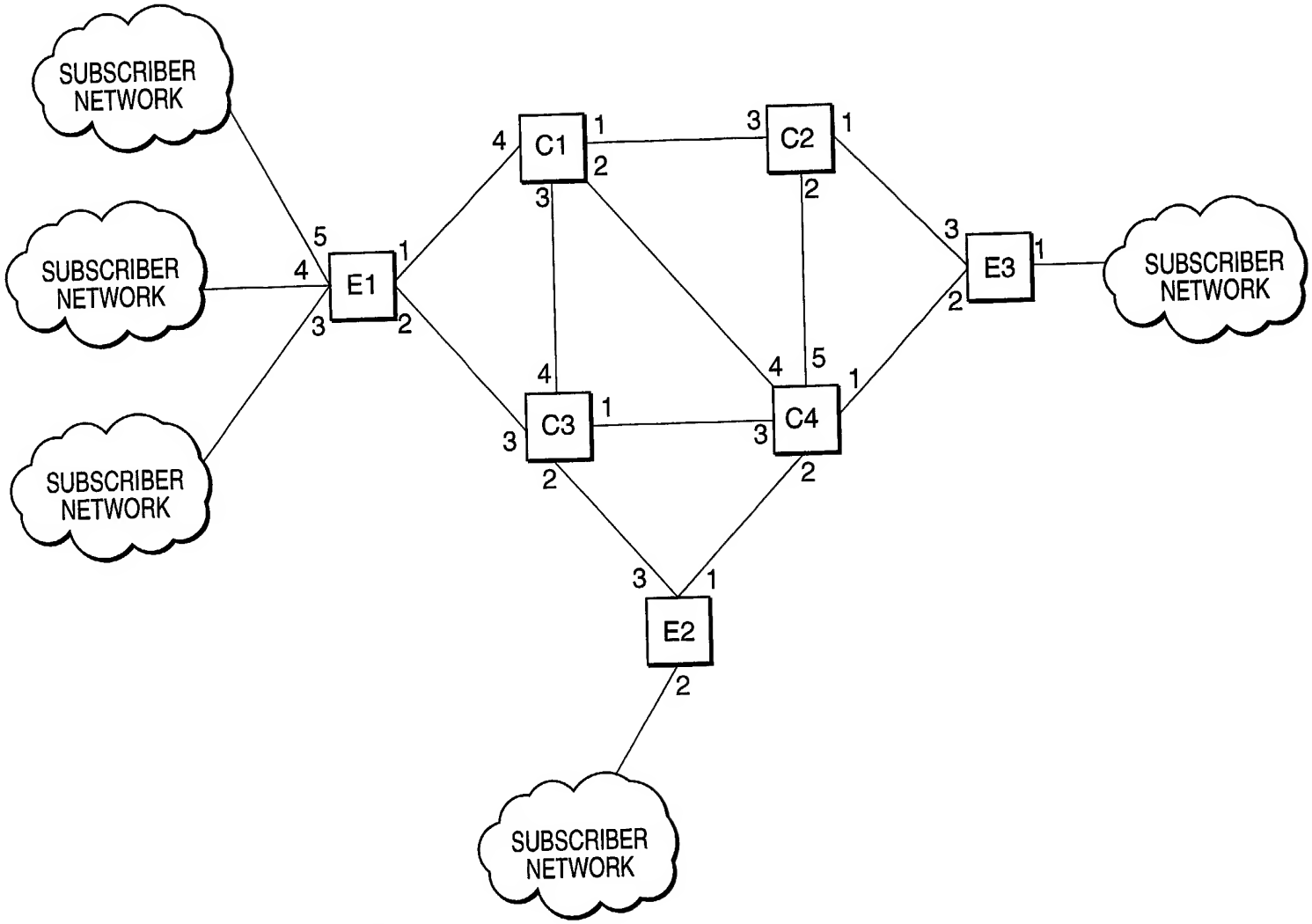

SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
E1
E2
E3
C1
C2
C3
C4

Fig. 12

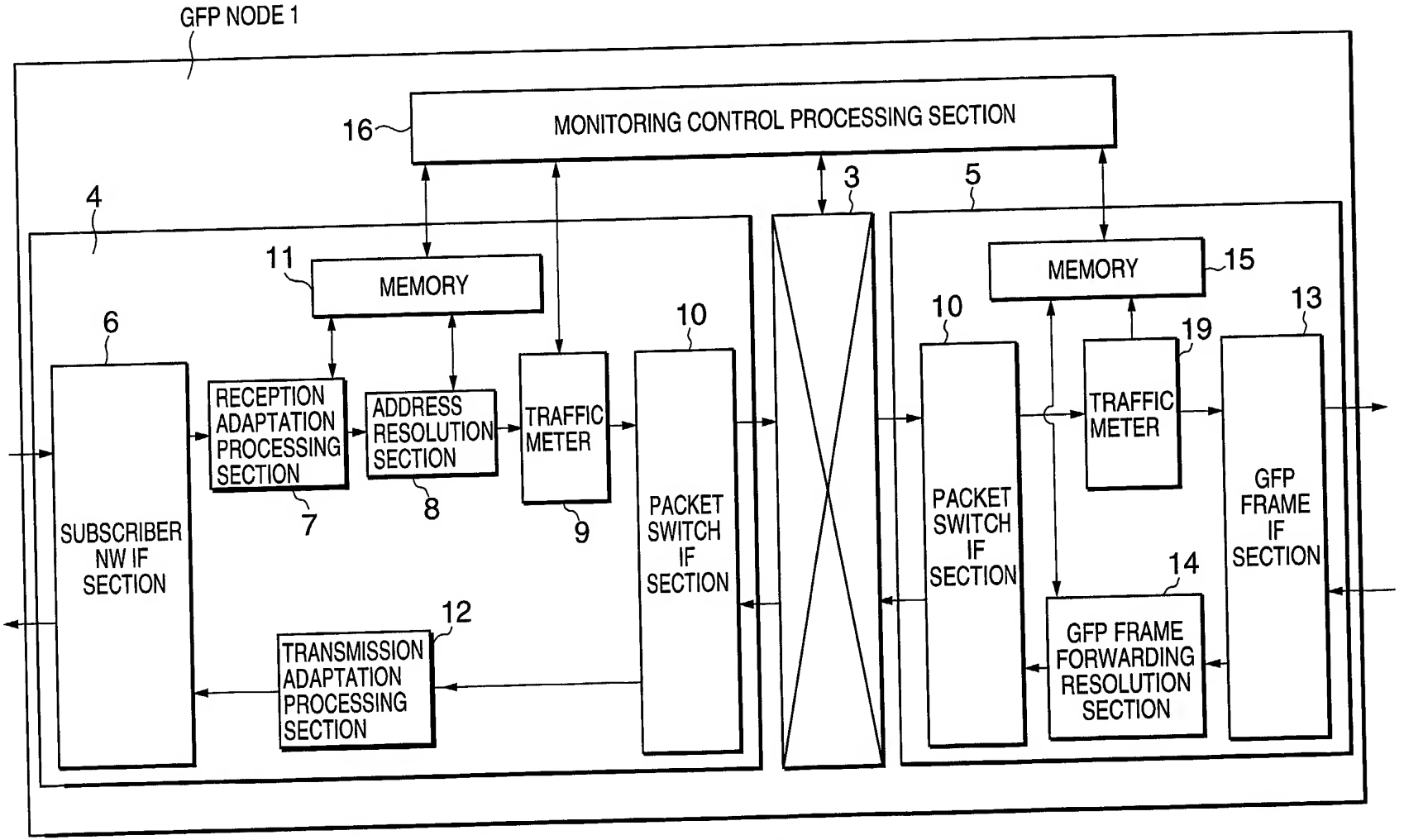

GFP NODE 1
16
MONITORING CONTROL PROCESSING SECTION
4
3
5
11
MEMORY
MEMORY
15
6
10
10
13
19
RECEPTION ADAPTATION PROCESSING SECTION
ADDRESS RESOLUTION SECTION
TRAFFIC METER
TRAFFIC METER
SUBSCRIBER NW IF SECTION
7
8
9
PACKET SWITCH IF SECTION
PACKET SWITCH IF SECTION
GFP FRAME IF SECTION
14
12
GFP FRAME FORWARDING RESOLUTION SECTION
TRANSMISSION ADAPTATION PROCESSING SECTION

Fig. 13

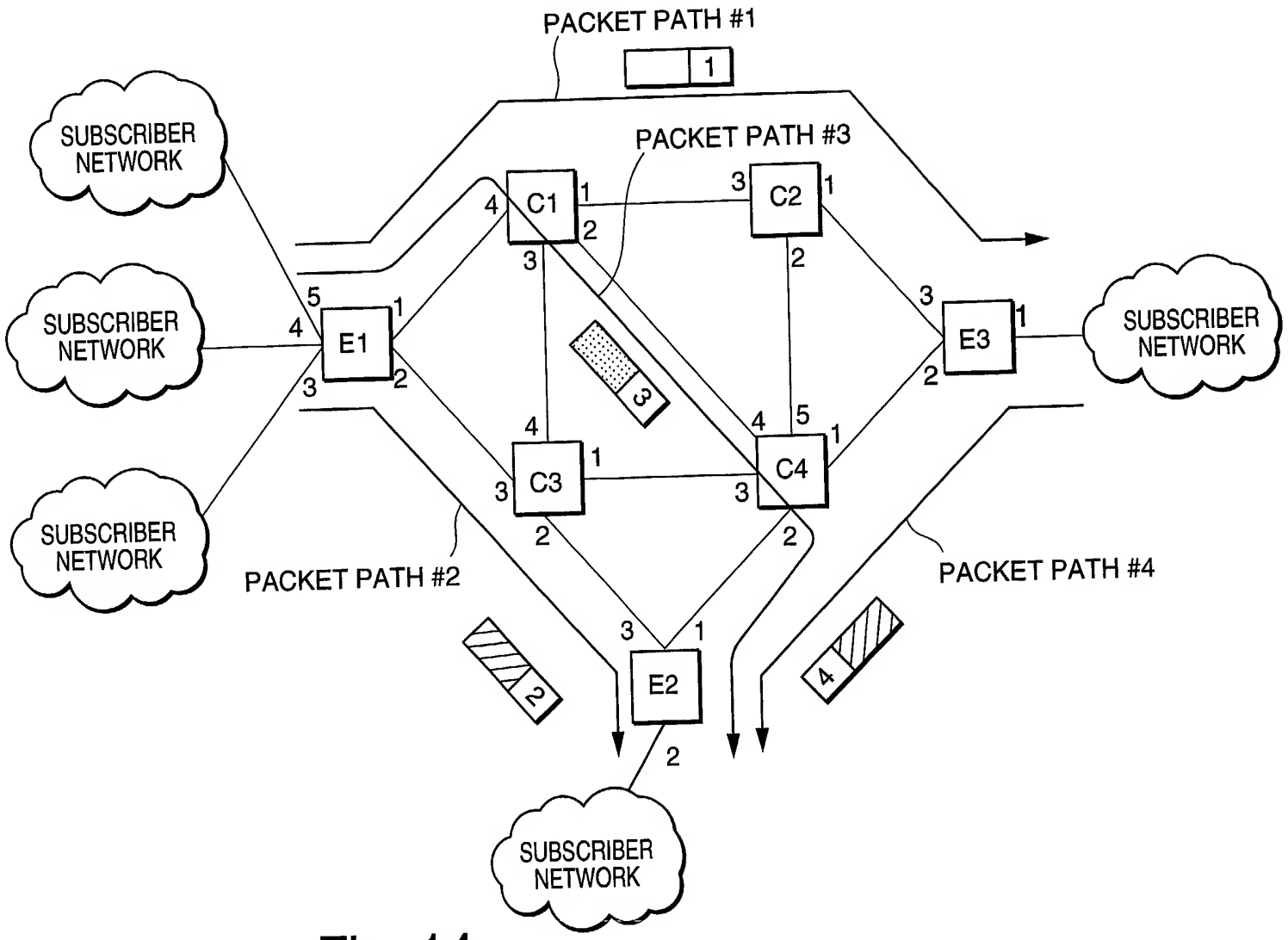

PACKET PATH #1
PACKET PATH #3
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
C1
C2
C3
C4
E1
E2
E3
PACKET PATH #2
PACKET PATH #4

Fig. 14

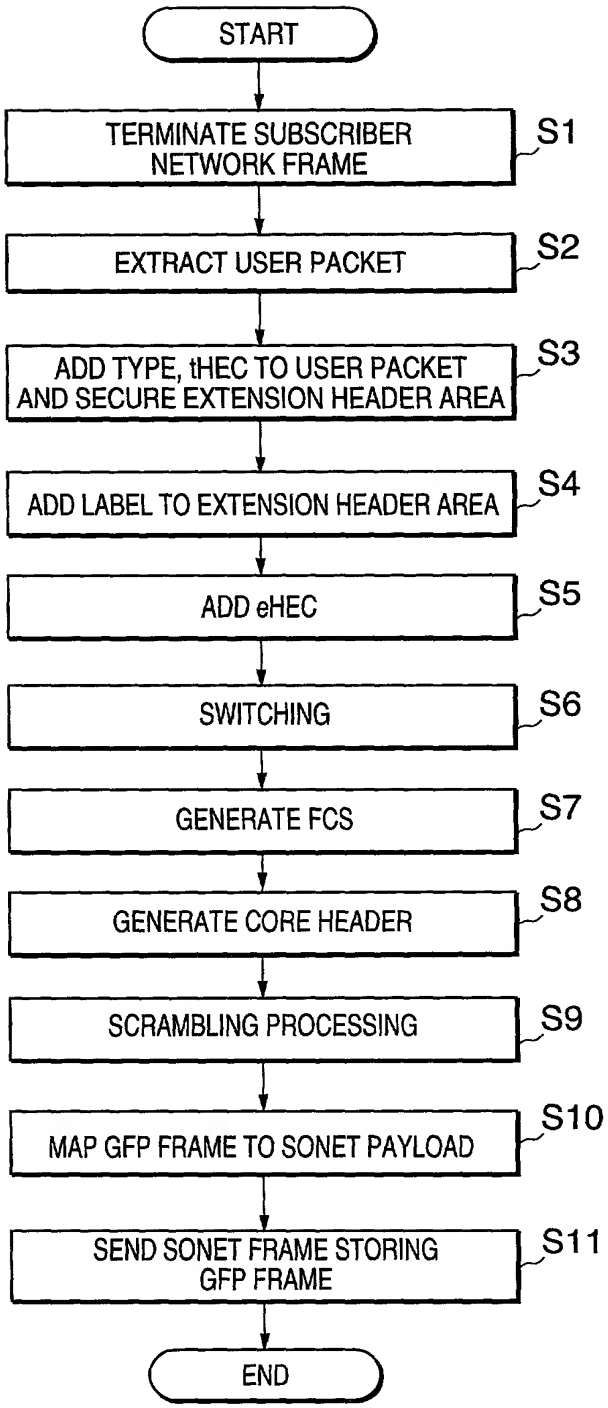

START
TERMINATE SUBSCRIBER NETWORK FRAME
S1
EXTRACT USER PACKET
S2
ADD TYPE, tHEC TO USER PACKET AND SECURE EXTENSION HEADER AREA
S3
ADD LABEL TO EXTENSION HEADER AREA
S4
ADD eHEC
S5
SWITCHING
S6
GENERATE FCS
S7
GENERATE CORE HEADER
S8
SCRAMBLING PROCESSING
S9
MAP GFP FRAME TO SONET PAYLOAD
S10
SEND SONET FRAME STORING GFP FRAME
S11
END

Fig. 15

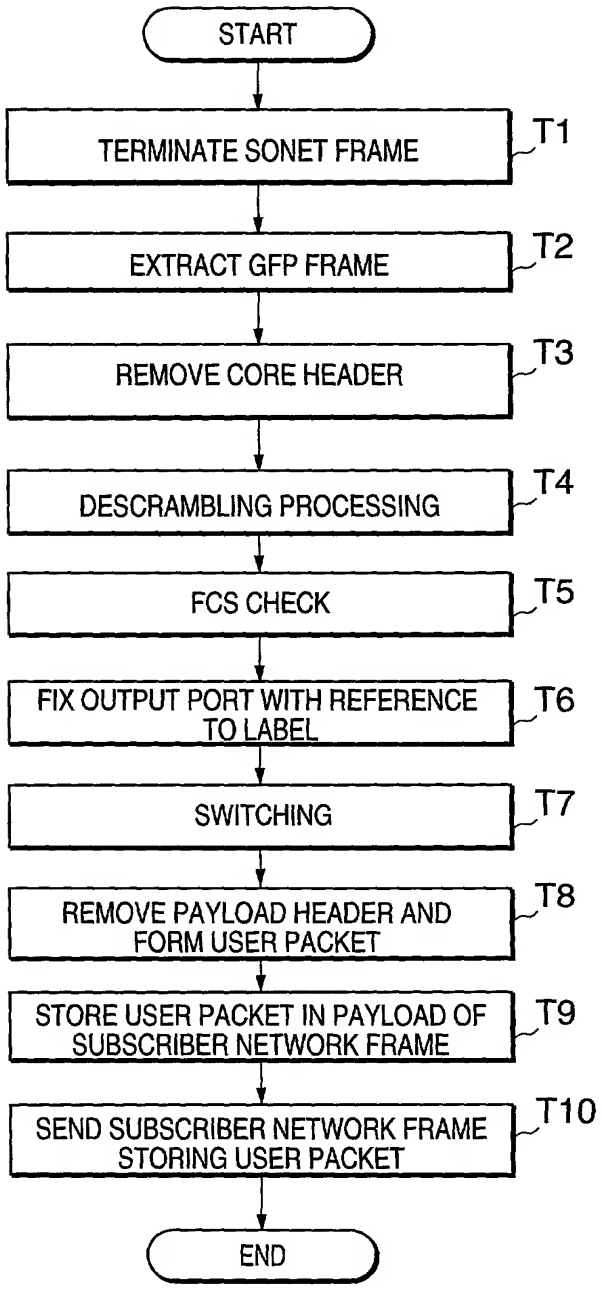

START
TERMINATE SONET FRAME
T1
EXTRACT GFP FRAME
T2
REMOVE CORE HEADER
T3
DESCRAMBLING PROCESSING
T4
FCS CHECK
T5
FIX OUTPUT PORT WITH REFERENCE TO LABEL
T6
SWITCHING
T7
REMOVE PAYLOAD HEADER AND FORM USER PACKET
T8
STORE USER PACKET IN PAYLOAD OF SUBSCRIBER NETWORK FRAME
T9
SEND SUBSCRIBER NETWORK FRAME STORING USER PACKET
T10
END

Fig. 16

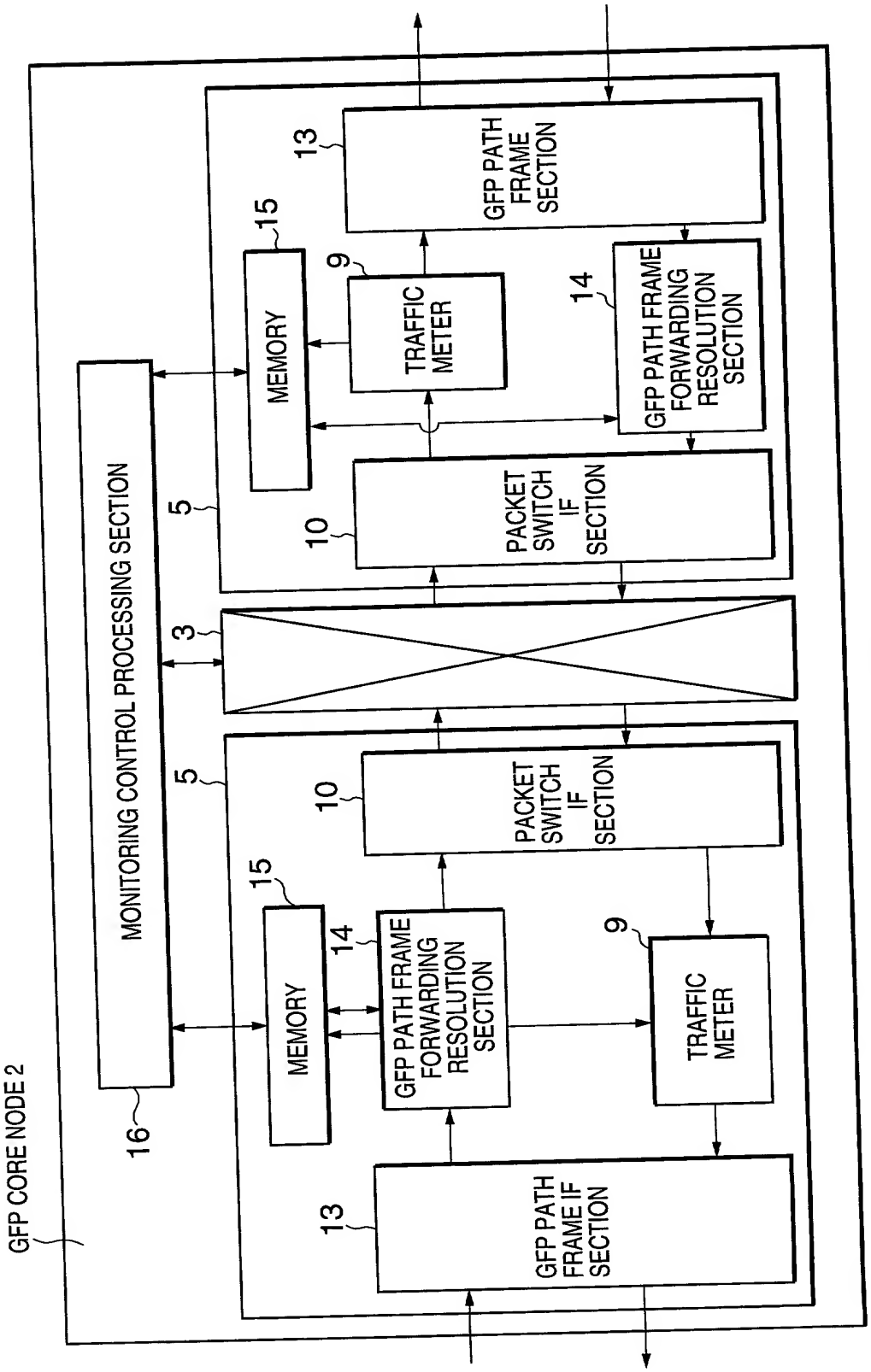

GFP CORE NODE 2
MONITORING CONTROL PROCESSING SECTION
16
5
MEMORY
15
GFP PATH FRAME FORWARDING RESOLUTION SECTION
14
TRAFFIC METER
9
PACKET SWITCH IF SECTION
10
GFP PATH FRAME IF SECTION
13
3
5
MEMORY
15
GFP PATH FRAME FORWARDING RESOLUTION SECTION
14
TRAFFIC METER
9
PACKET SWITCH IF SECTION
10
GFP PATH FRAME SECTION
13

Fig. 17

GFP EDGE NODE E1

ADDRESS CONVERSION TABLE

(a)

USER DEST ADDR	SONET DEST ADDR	PATH ID	INGRESS PORT	EGRESS LABEL	EGRESS PORT
A B	E3	1	5	1	1
C	E2	2	3	2	2
D	E2	3	4	3	1

GFP CORE NODE C1

TRANSFER TABLE

(b)

PATH ID	INGRESS LABEL	EGRESS PORT
1	1	1
3	3	2

GFP CORE NODE C2

TRANSFER TABLE

(c)

PATH ID	INGRESS LABEL	EGRESS PORT
1	1	1

GFP CORE NODE C3

TRANSFER TABLE

(d)

PATH ID	INGRESS LABEL	EGRESS PORT
2	2	2

GFP CORE NODE C4

TRANSFER TABLE

(e)

PATH ID	INGRESS LABEL	EGRESS PORT
3	3	2
4	4	2

GFP EDGE NODE E2

TRANSFER TABLE

(f)

PATH ID	INGRESS LABEL	EGRESS PORT
2	2	2
3	3	2
4	4	2

GFP EDGE NODE E3

TRANSFER TABLE

(g)

PATH ID	INGRESS LABEL	EGRESS PORT
1	1	1

Fig. 18

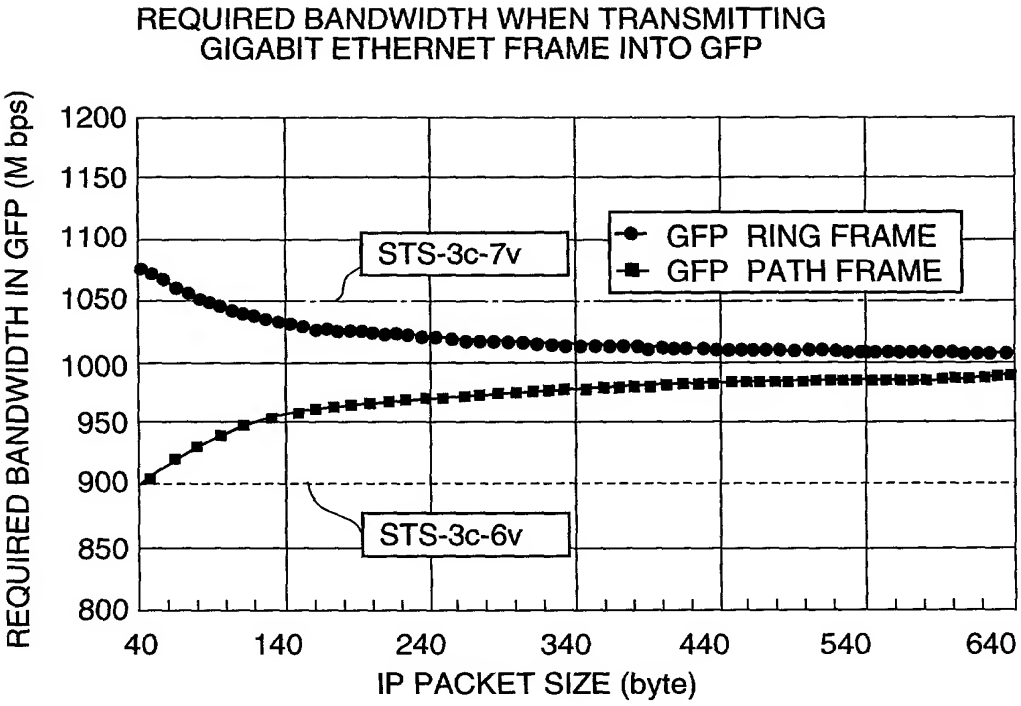

REQUIRED BANDWIDTH WHEN TRANSMITTING
GIGABIT ETHERNET FRAME INTO GFP
REQUIRED BANDWIDTH IN GFP (M bps)
1200
1150
1100
1050
1000
950
900
850
800
40
140
240
340
440
540
640
IP PACKET SIZE (byte)
STS-3c-7v
STS-3c-6v
GFP RING FRAME
GFP PATH FRAME

Fig. 19

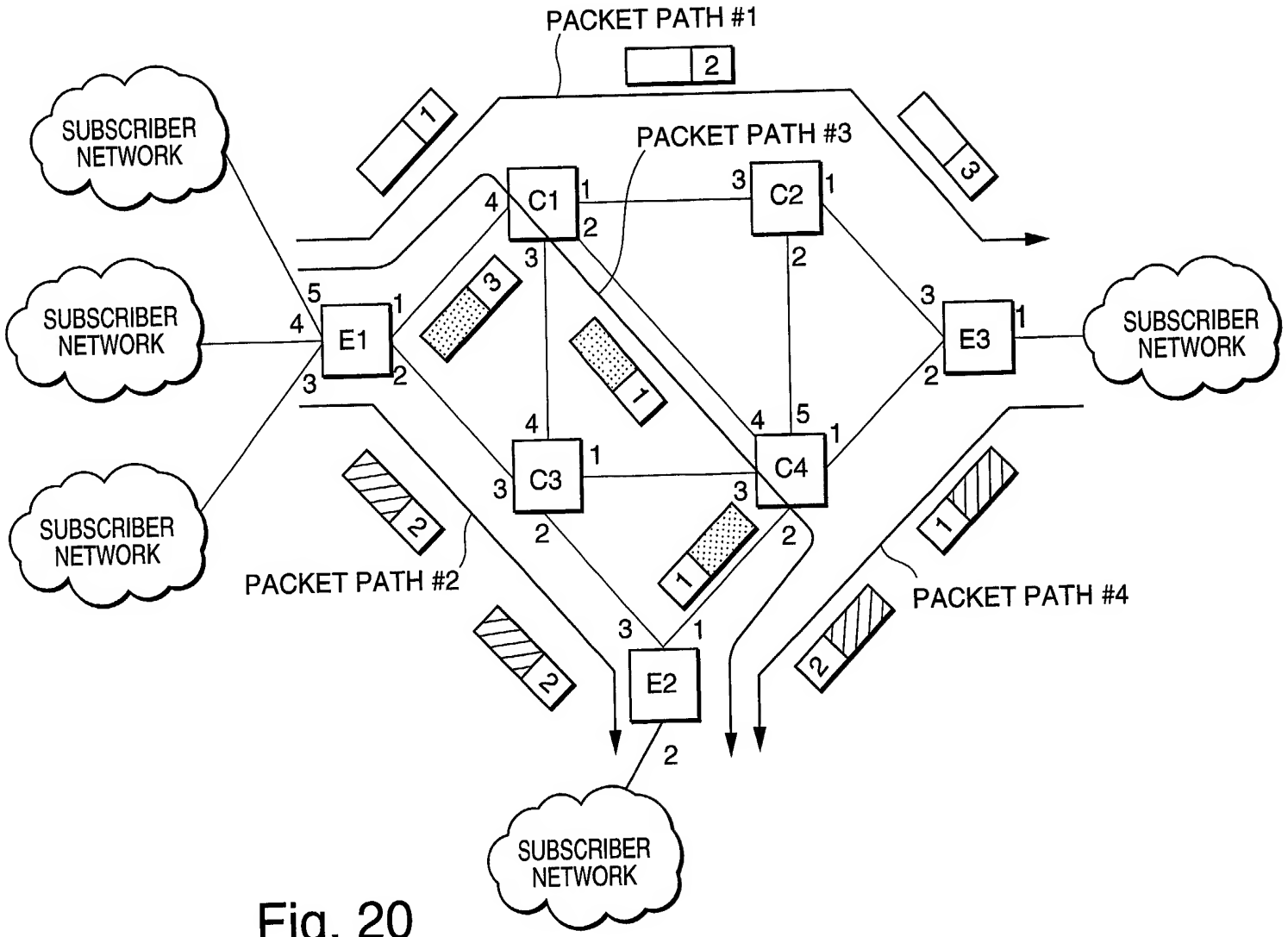

PACKET PATH #1
PACKET PATH #3
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
SUBSCRIBER NETWORK
C1
C2
C3
C4
E1
E2
E3
PACKET PATH #2
PACKET PATH #4

Fig. 20

(a)

GFP EDGE NODE E1
ADDRESS CONVERSION TABLE

USER DEST ADDR	SONET DEST ADDR	PATH ID	INGRESS PORT	EGRESS LABEL	EGRESS PORT
A B	E3	1	5	1	1
C	E2	2	3	2	2
D	E2	3	4	3	1

(b)

GFP CORE NODE C1
TRANSFER TABLE

PATH ID	INGRESS LABEL	INGRESS PORT	EGRESS LABEL	EGRESS PORT
1	1	4	2	1
3	3	4	1	2

(c)

GFP CORE NODE C4
TRANSFER TABLE

PATH ID	INGRESS LABEL	INGRESS PORT	EGRESS LABEL	EGRESS PORT
3	1	4	1	2
4	1	1	2	2

Fig. 21

	REQUIRED BANDWIDTH	
	PATH FRAME	RING FRAME
MAXIMUM(IP=40byte)	735Mbps	906Mbps
STS-1(49.92Mbps)	STS-1-15v(748.8Mbps)	STS-1-18v(898.56Mbps)
STS-3c(149.76Mbps)	STS-3c-5v(748.8Mbps)	STS-3c-6v(898.56Mbps)

Fig. 22